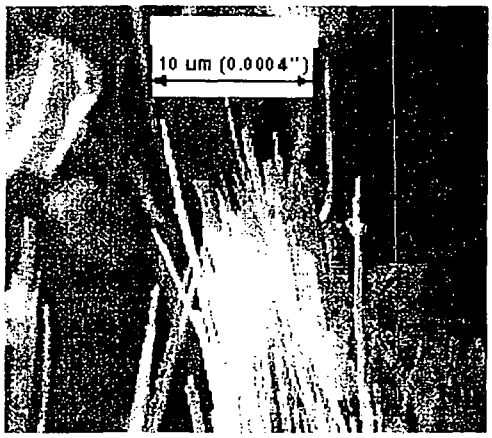
MARCOR REMEDIATION, INC.
HEALTH AND SAFETY PLAN
VERSION 1.1

SCREENING PLANT
OPERABLE UNIT 02
LIBBY, MT



Microscopic view of fibrous bundle in vermiculite
From the EPA website for Libby, Montana

Developed under contract no. DTRS57-96-D-00036, USDOT VOLPE
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Reviewed by: Bruce Lippy, CIH, CSP _____ 7-15-00 (date)

Seal

Procedure Number: 02-101-05

Procedure Name: Respiratory Protection

Effective Date: 04/07/98

Supersedes Procedure Number: 02-101-02 & 02-102-04

Responsible Positions: Assistant Operations Manager, Health and Safety Coordinator, Operations Administrator, Operations Manager, Supervisor, Technician

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Objective: Standard Operating Procedure (SOP) for respiratory protection. Provide detail of respiratory protection for asbestos and other environmental work in accordance with 29 CFR 1910.134

I. Written Respiratory Protection Program

A. Program Administration

The administration of the respiratory protection standard operating procedure (SOP) is the responsibility of the Operations Manager or a suitably trained designee under the direction of each General Manager. In addition, the program administrator is also responsible for complying with the state requirements for Occupational Safety and Health regulations.

The cooperation of the Operations Manager, Assistant Operations Manager, Supervisors, and Technicians is vital to the compliance of this procedure. The project Supervisor is responsible for continually monitoring the work area for potentially hazardous situations that may effect employees on site such as extreme temperatures, fatigue, humidity, work in confined spaces and other potential hazards.

B. The employee shall:

- use the provided respirator in accordance with instructions and training received
- guard against damage to respirator
- report any malfunction of the respirator to his/her Supervisor and/or the Health and Safety Coordinator immediately

C. Revisions

The respiratory protection procedure shall be reviewed for effectiveness at least annually and updated when necessary by the Health and Safety Committee or National Director.

D. The General Manager and Health and Safety Coordinator of each office are responsible for developing state specific supplements to this policy to ensure compliance with state and local requirements.

E. The respiratory protection program will include at a minimum:

- Procedures for selecting appropriate respirators
- Medical evaluation of employees required to use respirators
- Fit testing procedures for tight-fitting respirators
- Proper use of respirators in routine and reasonably foreseeable emergency situations
- Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding and maintaining respirators
- Procedures to ensure adequate air quality, quantity and flow of breathing air for atmosphere-supplying respirators
- Training of affected employees in respiratory hazards they may potentially be exposed to during routine and emergency situations, in the proper use of respirators including donning and doffing procedures, in any limitations of their use and in their proper maintenance.
- Procedures for regularly evaluating the effectiveness of the program

F. Respirator Selection

1. MARCOR shall select respirators from a sufficient number of respirator models and sizes so that the respirator is acceptable to and

correctly fits the user. All respirators provided will be NIOSH-certified respirators.

2. When selecting the type of respirator to be used, the following must be considered: worker activities; worker location in hazardous areas; performance limitations; anticipated airborne fiber concentrations for asbestos and an identification of the contaminant's chemical state and physical form for other contaminants. When the employee exposure cannot be reasonably estimated, the work atmosphere must be considered to be Immediately Dangerous to Life and Health (IDLH). Cartridges used for environmental work, such as organic vapor cartridges must be equipped with an end-of-service-life indicator.

3. Only full facepiece pressure demand SCBA certified by NIOSH for a minimum service life of thirty minutes or a combination full facepiece pressure demand supplied-air respirator (SAR) with auxiliary self-contained air supply are permitted in IDLH atmospheres. Respirators provided for emergency egress/escape from IDLH atmospheres must be NIOSH-certified for such purpose.

4. For work in asbestos abatement, the following procedures apply:

   a. When selecting a respirator for work in asbestos abatement, fiber concentration inside the facepiece must be .01 f/cc or less. To determine the expected fiber concentration, the following formula may be used:

   $$\text{Concentration Inside Respirator} = \frac{\text{Concentration Outside Respirator}}{\text{Protection Factor}}$$

   b. All respirators shall be jointly approved by Mine Safety and Health Administration (MSHA) and the National Institute for Occupational Safety and Health (NIOSH). Approved respirators and filters will display a code with the prefix TC (Tested and Certified) on the approval label.

c. Only MARCOR issued respirators may be utilized by MARCOR personnel. No employee is permitted to provide his/her own respirator. Each affected employee will be assigned his/her own respirator prior to the first job assignment. It is the employee's responsibility to bring his/her issued respirator to each job site on a daily basis. If an employee's respirator is rendered not functional, the employee shall promptly notify the Supervisor. It is the Supervisor's responsibility to contact the warehouse and obtain a new respirator for the employee.

d. A half-mask air purifying respirator, other than a disposable respirator equipped with high efficiency filters shall be provided whenever an employee performs Class II or Class III asbestos jobs where the employer does not produce a negative assessment and Class III jobs where TSI surfacing asbestos containing materials (ACM) or presumed asbestos containing materials (PACM) are being disturbed.

e. A full facepiece supplied air respirator operated in the pressure demand mode equipped with an auxiliary positive pressure self-contained breathing apparatus shall be provided for an employee where Class I work is being performed for which a negative exposure assessment has not been produced.

f. All employees with exposure potential shall be issued a powered air purifying respirator (PAPR). The respirators must be returned to the company upon request or termination of employment.

g. All employees are responsible for the hygiene of the respirators issued to them. Cleaner-sanitizer is available from the Supervisor or the warehouse. MARCOR will train, make available cleaning and sanitizing supplies and require verification by means of employee's signature on a sign off sheet that verifies the respirator has been cleaned, disinfected and stored properly.

h. Each employee will be issued one battery and charger with the PAPR. The battery should be fully charged prior to the start of each shift. Prior to charging the battery, the battery should be allowed to run until it is dead. It is the responsibility of the employee to ensure a full charge on the battery daily.

i. Protection level determination shall be accomplished by collecting air samples daily from each work area prior to the start of each project or phase of a large project to determine the degree of hazard to which the employee will be exposed. Based on the airborne concentration of asbestos, the appropriate respiratory protection shall be selected by the Project Manager or Supervisor from the table below. Consideration must be given to all present and anticipated contaminants and other safety hazards that may be encountered in the normal performance of abatement functions. MARCOR permits an inside mask exposure no greater than .01 f/cc.

Airborne Concentration of Asbestos in Work area [all as 8 hour Time Weighted Average (TWA)]	Required Respirator
Not in excess of 1 f/cc	Half-mask air purifying respirator other than disposable respirator equipped with high efficiency filters.
Not in excess of 5 f/cc	Full facepiece air purifying respirator equipped with high efficiency filters.
Not in excess of 10 f/cc	Any powered air purifying respirator (PAPR) equipped with high efficiency filters or any supplied air respirator operated in continuous flow mode.
Not in excess of 100 f/cc	Full facepiece supplied air respirator operated in pressure demand mode.

Greater than 100 f/cc or concentration unknown	Full facepiece supplied air respirator operated in pressure demand mode, equipped with an auxiliary positive pressure self contained breathing apparatus.

In accordance with 29 CFR 1926.1101, historical data collected by MARCOR may be used to assign the anticipated level of respirator protection required.

5. For other environmental work, the following procedures and guidelines apply:

   a. The normal atmosphere consists of 78% nitrogen, 21% oxygen, 0.9% inert gases and 0.04% carbon dioxide. An atmosphere containing toxic contaminants, even at very low concentrations could be a hazard to the lungs and body. A concentration large enough to decrease the percentage of oxygen in the air can lead to asphyxiation, even if the contaminant is an inert gas.

   b. There are three main respiratory hazards:

      - Oxygen deficient air
      - Air laden with aerosols
      - Air laden with gaseous contaminants
      - Oxygen Deficiency

      The body requires oxygen to live. If the oxygen concentration decreases, the body reacts in various ways, see Table 1. Death occurs rapidly when the concentration decreases to 6%.

Table 1 - Physiological Effect of Oxygen Deficiency	
% Oxygen (by volume) At Sea Level	Effects
21-16	Nothing abnormal
16-12	Loss of peripheral vision, increased breathing volume, accelerated heartbeat, impaired attention, thinking and coordination
12-10	Very faulty judgement, very poor muscular coordination, muscular exertion causes fatigue that may cause permanent heart damage, intermittent respiration.
10-6	Nausea, vomiting, inability to perform vigorous movement, or loss of all movement, unconsciousness followed by death
<6	Spasmatic breathing, convulsive movements, death in minutes

- Physiological effects of oxygen deficiency are not apparent until the concentration decreases to 16%. The various regulations and standards dealing with respirator use recommend that concentrations ranging from 16-19.5% be considered indicative of an oxygen deficiency.

- Such numbers take into account individual physiological responses, errors in measurement, and other safety considerations. In hazardous materials response operations 19.5% oxygen in air is considered the lowest "safe" working concentration.

- Aerosols

- Aerosol is a term used to describe fine particulates (solid or liquid) suspended in air. Aerosols can be classified in two ways: by their physical form and origin and by the physiological effect on the body.

- Physical Classification

    - Mechanical dispersoid: liquid or solid particle mechanically produced.

    - Condensation dispersoid: liquid or solid particle often produced by combustion.

    - Spray: visible liquid mechanical dispersoid.

    - Fume: extremely small solid condensation dispersoid.

    - Mist: liquid condensation dispersoid.

    - Fog: mist dense enough to obscure vision.

    - Smoke: liquid or solid organic particles resulting from incomplete combustion.

    - Smog: mixture of smoke and fog.

- Physiological Classification

    - Nuisance: no lung injury but proper lung functioning inhibited.

    - Inert pulmonary reaction causing: non-specific reaction.

- Pulmonary fibrosis causing: effects ranging from nodule production in lungs to serious diseases such as asbestosis.
- Chemical irritation: irritation, inflammation, or ulceration of lung tissue.
- Systemic poison: diseases in other parts of the body.
- Allergy-producing: causes allergic hypersensitivity reactions such as itching or sneezing.

- Gaseous Contaminants
  - Gaseous contaminants can be classified chemically and physiologically.
  - Chemical Classification
    - Acidic: acids or react with water to form acids.
    - Alkaline: bases or react with water to form bases.
    - Organic: compounds which contain carbon; may range from methane to chlorinated organic solvents.
    - Organometallic: organic compounds containing metals.
    - Hydrides: compound in which hydrogen is bonded to another metal.
    - Inert: no chemical reactivity.

- Physiological Classification

  - Irritants: corrosive substances which injure and inflame tissue.

  - Asphyxiants: substances which displace oxygen or prevent the use of oxygen in the body.

  - Anesthetics: substances which depress the central nervous system, causing a loss of sensation or intoxication.

  - Systemic poisons: substances which can cause disease in various organ systems.

c. The basic function of a respirator is to reduce the risk of respiratory injury due to breathing airborne contaminants. A respirator provides protection by removing the contaminants from ambient air or by supplying the wearer with an alternate source of clean breathing air.

All respiratory apparatus are composed of two main parts: (1) the device which supplies or purifies air, and (2) the facepiece which covers the nose and mouth and seals out the contaminants. The first component defines what class of respirator the device is; the second determines the relative measure of protection afforded by that respirator.

- Classes of Respirators

  Respirators are divided into two major classifications according to their mode of operation:

  1. Air Purifying Respirators (APR's) remove contaminants by passing the breathing air through a purifying element. There are a wide variety of APR's available to protect against

specific contaminants, but they all fall into two subclasses: (1) particulate APR's which employ a mechanical filter element, and (2) gas and vapor APR's that utilize chemical absorbents contained in a cartridge or canister.

It is important to realize that there are limitations on the applications of APR's. These devices are specific for certain types of contaminants, so the identity of the hazardous agent must be known. There are maximum concentration limits; this requires a knowledge of the ambient concentration of the contaminant, as well as the Maximum Use Limit (MUL) of the respirator. There are certain materials that cannot use cartridge respirators with (see Appendix A). Also the contaminant material must have adequate warning properties (see Appendix B). Since APR's only clean the air, the ambient concentration of oxygen must be greater than 19.5% for the user. Appendix C is a decision tree which describes if an air purifying respirator can be used.

2. Atmosphere - Supplying Respirators (ASR's) provide a substitute source of clean breathing air. The respirable air is supplied to the worker from either a stationary source through a long hose, or from a portable container. The first type are called supplied air respirators and the latter are known as self-contained breathing apparatus (SCBA).

These devices can be used regardless of the type of airborne contaminant or oxygen concentration. However, the contaminant concentration limits vary for the different types

of ASR's and the wearer must be aware of the limitations of his/her respirator.

The use of respirators is prohibited when conditions prevent a good facepiece to face seal. Some examples of these conditions are mustaches, beards, sideburns, skullcaps, long hair, make-up, temple pieces on eyeglasses. Because maintaining a leak-free seal is so important, personnel required to wear respirators must successfully past a fit-test designed to check the integrity of the seal.

d. There are two types of fit-tests: quantitative and qualitative. The quantitative test is an analytical determination of the concentration of a test agent inside the facepiece compared to that outside the mask. This concentration ratio is called the Protection Factor (PF) and is a measure of the relative protection offered by a respirator. For example, if the ambient concentration of the test agent is 1000 ppm, this respirator gives the tested individual a PF of 100. The calculation to be used to determine the protection factor is as follows:

$$PF = \frac{\text{Concentration outside mask}}{\text{Concentration inside mask}}$$

- Table 2 lists several types of respirators and their PF's.

A Protection Factor is used to determine the Maximum Use Limit (MUL) of a successfully fit-tested respirator. The MUL is the highest concentration, not exceeding IDLH concentration, of a specific contaminant in which a respirator can be worn:

$$MUL = PF \times TLV$$

For example, if a contaminant has a TLV-TWA of 10 ppm, then the MUL for any half-mask respirator is 100 ppm; the

MUL for a full-facepiece APR or demand SCBA is 1000 ppm. If the ambient concentration is greater than 1000 ppm, then a pressure demand SCBA is required.

Fit testing and Protection Factors are only two of the several considerations for selecting the proper respirator.

Table 2 - Selected Respirator Protection Factors	
Type of Respirator	PF (Qualitative Test)
Air Purifying Quarter mask Half mask	 10 10
Air-line Quarter mask Half mask	 10 10
Hose-mask - Full facepiece	10
SCBA, demand Quarter mask Half mask	 10 10
Air Purifying - Full facepiece	100
Airline demand- Full facepiece	100
SCBA demand - Full facepiece	100
Airline, pressure-demand with escape provision-full facepiece (no test required)	10,000+
SCBA, pressure-demand or positive pressure-full facepiece (no test required)	10,000+

e. In general the selection of the proper approved respirator depends upon:

- The nature of the hazard.
- The characteristics of the hazardous operation or process.
- The location of the hazardous area with respect to a safe area having respirable air.
- The period of time for which respiratory protection may be provided.
- The activity of workers in the hazardous area.
- The physical characteristics, functional capabilities, and limitations of respirators of various types.
- The respirator protection factors and respirator fit.

f. Proper respiratory protective gear will be selected only by personnel qualified to do so based on training and experience. Such training must provide clear understanding of protection factors, calculations, exposure limits, symptoms of exposure, and function of respiratory protection gear.

g. The respiratory protection selected should be appropriate for the job. Accordingly, selection will follow a hierarchy of matching protection with the hazard. This hierarchy is arranged thus:

Protection Level	Respirator / Protection Factor
Level 1	Half Face, air purifying respirator (1/2 F, APR) Protection Factor 10
Level 2	Full Face air purifying respirator (FF, APR) Protection Factor 50

Protection Level	Respirator / Protection Factor
Level 3	Full Face, powered air purifying respirator (FF, PAPR) Protection Factor 100
Level 4	Full Face, positive pressure supplied air (airline system) (SAD:PD) Protection Factor 2000
Level 5	Full face, positive pressure, self contained breathing apparatus (SCBA: PP) Protection Factor 2000

h. It is the policy of this company to always be in compliance with the law regarding exposure to air borne or physical hazards. In those instances where the American Conference of Governmental and Industrial Hygienists (ACGIH) recommends a TLV which is more conservative than the OSHA established permissible exposure limit (PEL), the more conservative of the two values will be observed.

i. No respiratory protection is needed if <u>all</u> of the following criteria have been satisfied:
   1. Any airborne hazards have been identified and quantified.
   2. The exposure levels are lower than the more conservative of either the PEL or the ACGIH TLV.
   3. The situation is monitored by a qualified person to detect any change.

j. Level 1 respiratory protection (1/2 F:APR) may be used if the following criteria have been satisfied.
   1. Any airborne hazards have been identified and quantified.
   2. The respirator cartridge used must give protection from the hazard identified. This "match" is best made by consulting the manufacturers literature. If in doubt, consult with the manufacturers technical service department.
   3. An adequate face to mask seal must be demonstrated.

4. The concentration of the hazard identified must not exceed ten (10) times the PEL/TLV (whichever is lower). If the hazard concentration exceeds such a level, respiratory protection must be upgraded.
5. The hazard in question must exhibit adequate warning properties (see Appendix C for Warning Concentrations of Various Chemicals). An exception to this can be made if a qualified person continuously monitors the concentration levels of the hazard and calculates the life of the cartridge based on concentration vs. service life data.
6. Oxygen levels must be at least 19.5%.
7. The concentration of the hazard identified must be less than the immediately dangerous to life and health (IDLH) or the limits defined by manufacturer.
8. Eye protection from vapors, mists or particles is not needed.

k. Level 2 respiratory protection (FF, APR) may be used if all requirements pertaining to level 1 have been met except that:
1. The concentration of the hazard identified must not exceed 50 times the TVL/PEL (whichever is lower). If the hazard concentration exceeds such a level, respiratory protection must be upgraded.
2. Eye protection from vapors, mists and particulates is needed.

l. Level 3 respiratory protection (FF:PAPR) may be used if all requirements for level 2 have been met except that:
1. The concentration of the hazard identified must not exceed 100 times the PEL/TLV (whichever is lower). If hazard concentrations exceed such a level, respiratory protection must be upgraded. Note that in the event of a pump failure, this mask becomes simply an APR with a protection factor of 50.

m. Level 4 respiratory protection (SAF:PP) may be used if all the requirements for level 3 have been met except that:
1. This respiratory system gives protection from hazard concentrations up to 2000 times the PEL/TLV.
2. This respiratory protective system should be used when hazard contaminant and concentration is unknown, oxygen levels are

below 19.5% or if respirator cartridges are inadequate for the protection needed.

3. If hazard concentrations exceed the IDLH level, an emergency escape bottle (5 minute hip bottle) must be worn. If the hip bottle is not worn, air monitoring must be performed to ensure that hazard concentrations do not exceed the IDLH level.

n. Level 5 respiratory protection (SCBA:PP) is regarded as giving the greatest degree of protection possible; a potential factor of 2000 has been assigned. When hazard identified would degrade the airline hose this level would be used or when using a hose line is impractical.

G. Medical Surveillance / Evaluation

A physical is required prior to employment. The physical examination shall be in accordance with 29 CFR 1926.1101 and/or 1910.120 and shall include: medical and work history with emphasis on pulmonary, cardiovascular and gastrointestinal systems, physical exam directed to pulmonary and gastrointestinal systems. MARCOR requires a chest x-ray at the time of the initial physical or within the year prior to employment. Chest x-ray is not required for an annual physical but is left to the discretion of the physician.

The medical examination shall include a determination in the form of the physician's written opinion of the employee's ability to both physiologically and psychologically wear a respirator. Any recommendation limiting or prohibiting the wearing of a respirator shall be provided to MARCOR in the written opinion. The physician's written opinion shall also contain any recommendations for follow-up medical evaluations, if applicable, and a statement that the physician or Licensed Health Care Professional has provided the employee with a copy of the written recommendation. A physician or Licensed Health Care Professional (PLHCP) will perform medical evaluations using the medical questionnaire as required in 29 CFR 1910.134 and by initial medical examination.

Medical examinations shall be performed by or under the supervision of a licensed physician. Medical surveillance will continue with a minimum of an annual examination as specified for initial examination and completion of the questionnaire from 29 CFR 1926.1101 Appendix D Part 2. Initial medical

examination shall include completion of the questionnaire from 29 CFR 1926.1101 Appendix D Part 1.

In addition, the OSHA Respirator Medical Evaluation Questionnaire found in 29 CFR 1910.134 Appendix C, Part A must be administered confidentially during the employee's normal working hours or at a time and place convenient to the employee. The employee will also be given an opportunity to discuss his/her examination results with the physician or PLHCP. The phone number of the physician or PLHCP can be obtained by calling the Human Resources Administrator in Hunt Valley at (800)547-0128 or (410) 785-0001.

The examining physician shall not disclose in the written opinion to MARCOR, any findings or diagnoses unrelated to occupational exposure to asbestos.

A termination examination shall be made available to any employee exposed to levels of asbestos at or above the action level without respiratory protection. The examination shall be conducted as indicated for an initial medical examination and be given within 30 calendar days prior to or following termination of employment.

Although it may not be of great importance in asbestos abatement work, a hole in the tympanic membrane (the ear drum) can be very important if the worker is dealing with chemicals or fumes. The anatomic connections between the ear, the throat, and thus the airway provide a route of hazard entry into the lungs regardless of the mask fit.

All medical surveillance records shall be maintained by MARCOR or a contractually bound entity for the duration of employment plus thirty years for each employee. Medical records are available to the employee upon request.

Exposure Measurement for Asbestos Abatement

The Supervisor is responsible to designate which employees receive personal samples and to complete the Air Monitoring Data Sheet Form #02101F3.

This form is submitted with personal sample cartridges to the Industrial Hygienist analyzing the sample.

Personal air samples of at least one employee must be collected at a minimum of one per day per activity per work area. Personal samples must be taken daily while the employees are in containment and must continue daily until satisfactory reliable measurements reveal exposures below the action level. Each employee must have a personal sample at least once every six months.

Exception: Personal air samples are not required when all employees in the work area are utilizing supplied air respirators operated in the positive pressure mode.

Personal monitoring pumps shall be affixed to the employee's belt with the air hose extending up the back and over the shoulder to allow maximum movement of the employee's arms and reduce the potential for inadvertent hose tangles. Personal monitoring pumps must be calibrated between .5 and 2.5 liters per minute before and after each air sample is taken.

Personal air samples shall be taken from the breathing zone and be representative of the 8-hour TWA of each employee in that area for that shift performing the same job functions.

For an 8 hour TWA standard, the period of measurement is 8 hours. A personal exposure "measurement" consists of one or more samples taken within the work area during the measurement period. One of the cassettes used to sample for the personal exposure monitoring should be taken for thirty (30) minutes during peak exposure and analyzed independently as an excursion measurement as well as part of the 8 hour TWA for the personal exposure measurement.

MARCOR relies on industrial hygienists hired by customers to monitor outside the work area. The personal monitoring information prepared by the hygienist must be recorded on letterhead of the firm providing analysis. Results of exposure measurement shall include: the date of measurement, MARCOR job number, sampling and analytical methods used and evidence of their accuracy, number, duration and results of samples taken, type of respirator used, name, social security number and exposure of the employee

sampled and those represented by the same sample results. A copy of the original report shall be filed in the employee's personnel file and a copy forwarded to Personnel in Hunt Valley.

The Operations Manager or his/her designee is responsible for exposure measurement and related documentation. Personal monitoring results shall be documented on the Personal Monitoring Results Form #02101F1 and shall be posted for thirty days in a central location accessible to all employees. Following required posting time, Personal Monitoring Results form shall be filed under personal monitoring and maintained in close proximity to the personnel files.

Exposure monitoring results must be maintained for the duration of employment plus thirty years. This documentation shall be kept in personnel files.

Method of Analysis for Exposure Monitoring

Phase Contract Microscopy (PCM) Analysis of job monitoring and exposure measurement must be by use of OSHA Reference Method (ORM) or an equivalent counting method.

MARCOR requires samples to be analyzed by a firm meeting the requirements of and contractually bound by the Periodic Industrial Hygiene Services Agreement. (See MARCOR Procedure # 02-210 on Sampling & Inspection Requirements - Asbestos).

Blank cassettes (2 or 10% of personal sample cassettes, whichever is greater) must be submitted with each sample or group of samples.

H. Respirator Fit Testing

1. Fit testing in accordance with 29 CFR 1910.134 will be conducted on all positive and negative pressure respirators including those that have negative pressure as the auxiliary system. MARCOR requires the use of Stannic Chloride for fit testing negative pressure respirators. Fit testing shall be performed:

- with initial assignment of respirator
- every six months thereafter
- following any repair
- each time a new respirator facepiece (size, style, model or make) is used
- whenever the employee reports or a MARCOR representative or the PLHCP makes a visual observation of changes in the employee's physical condition that could affect the fit.

2. Qualitative fit test only may be used to fit test negative air-purifying respirators that must achieve a fit factor of 100 or less. Tight-fitting atmosphere-supplying and tight fitting powered air purifying respirators may be fit tested by performing quantitative or qualitative fit testing in the negative pressure mode, regardless of the mode of operation that is used for the respirator (e.g., negative pressure or positive pressure).

In order to fit test supplied air or power air purifying respirators (PAPR) using the qualitative method, the employee's facepiece must be temporarily converted into a negative pressure respirator using appropriate filters or by using an identical negative pressure air purifying respirator facepiece with the same sealing surfaces as a surrogate for the atmosphere supplying or PAPR facepiece.

If the fit factor is equal to or greater than 100 for a half facepiece respirator or equal to or greater than 500 for a full facepiece respirator using the quantitative fit testing method, the respirator has passed the quantitative test.

Qualitative and quantitative fit testing procedures are explained in 29 CFR 1910.134. See attached instructions and forms, Form #02101F4, #02101F5 and #02101F6.

The quantitative fit test is one in which the wearer is placed in an atmosphere containing an easily detectable nontoxic gas, vapor or aerosol. The atmosphere inside the respirator is sampled continuously through a probe on the facepiece as the wearer performs a number of exercises involving facial, head and body movements. The leakage, or penetration, is expressed as a percentage of the challenge atmosphere outside the respirator.

To perform quantitative fit tests the respirator may have to be irreversibly altered. If the respirator must be permanently altered, MARCOR will provide a representative of each model in each size to be adapted for fit testing purposes or obtain probed models.

In the qualitative fit test, the wearer is exposed to an atmosphere containing a test agent which can be detected by a sensation of odor, taste or irritation. The test relies on the subjective response of the wearer as to whether or not the test agent penetrated into the interior of the facepiece. If the wearer is unable to detect any penetration, then it is assumed that there is a satisfactory fit between the facepiece and the wearers face.

MARCOR requires that qualitative fit testing be administered by a competent person as defined by 29 CFR 1926.1101 who has been trained in the appropriate means of preparing test solutions, calibrating equipment, performing tests properly, recognizing invalid tests and ensuring that test equipment is working properly or by an industrial hygiene firm in accordance with and bound by the Periodic Industrial Hygiene Service Agreement. MARCOR requires that quantitative fit tests be administered by an industrial hygiene firm in accordance with and bound by the Periodic Industrial Hygiene Services Agreement.

Respirator fit test documentation shall be on letterhead of the industrial hygiene firm responsible for administering the test and shall contain at a minimum:

- Type of respirator fitting test used.
- Specific make and model of respirator tested.
- Size of facepiece.
- MARCOR identification number on respirator.
- Name and social security number of person tested.
- Name of test operator.
- Signature of test operator.
- Date of test.
- Results of respirator fit test.
- Success or failure of person to obtain satisfactory fit if a qualified respirator fitting was carried out.

- Respirator protection factor based upon test results if a quantitative respirator fitting test was carried out.

Respirator fit test documentation shall be maintained in the personnel file of each employee for the duration of employment plus thirty years.

In addition to regular fit testing, MARCOR requires a user seal check be performed daily by all employees each time the employee dons the respirator in accordance with 29 CFR 1910.134. User Seal Checks shall be initiated by the Supervisor or other "Competent Person" for those employees utilizing negative pressure or negative pressure auxiliary respirators.

The employee must perform the Daily User Seal Checks each time the he/she dons the respirator in accordance with 29 CFR 1910.134. These two tests are used to check positive and negative pressure seal:

- Negative Pressure Test. Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece maintains its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory. This test can be used on air-purifying respirators equipped with tight fitting respirator inlet coverings and atmosphere-supplying respirators equipped with tight fitting respirator inlet coverings and breathing tubes which can be squeezed or blocked at the inlet to prevent the passage of air.

- Positive Pressure Test. Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators, this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation

valve and then carefully replacing it after the test. A positive pressure test can be used on respirators equipped with tight fitting respiratory inlet coverings which contain both inhalation and exhalation valves.

As an additional precautionary measure, MARCOR requires a fit check be performed on all employees at the start of the shift the first working day of the week and the first working day of a project. Fit checks shall be administered by the Supervisor or other "Competent Person" to those utilizing negative pressure or negative pressure auxiliary respirators. Fit check documentation shall be filed in the job file and a copy forwarded to the Human Resources Department in Hunt Valley.

All Supervisors and Technicians must participate in the weekly fit checks. Each individual shall be exposed to an irritant smoke (stannic chloride), odorous isoamyl acetate vapor, or other suitable test agent easily detectable by irritation, odor, or taste (the appropriate air purifying element must be used). If the respirator wearer is unable to detect the test agent in the respirator, it can be reasonably assumed that the seal of the respirator to the wearer is satisfactory. However, as stated above, the fit check is a precautionary measure only. It does not preclude the use of regular fit testing and daily user seal checks in accordance with this policy. The Supervisor will conduct and document the fit check.

I. Training

Prior to job assignment, all employees shall successfully complete a training program. The basic training program content shall include a minimum of the following:

- The reasons for the need of respiratory protection and how improper fit, usage or maintenance can compromise the effectiveness of the respirator.

- The nature, extent, and effects of respiratory hazards to which the person may be exposed and how to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.

- An explanation of why engineering controls may not be adequate.
- An explanation of why a particular type of respirator has been selected for a specific respiratory hazard.
- An explanation of the operation and the capabilities and limitations of the respirator selected.
- Instruction in inspecting, donning, checking the fit of and wearing the respirator.
- An opportunity for each respirator wearer to handle the respirator, learn how to don and wear it properly, check its seals, wear it in a safe atmosphere, and wear it in a test atmosphere.
- An explanation of how maintenance and storage of the respirator is carried out.
- Instruction in how to recognize and cope with emergency situations, including situations where a respirator malfunctions
- Instructions as needed for special respirator use.
- Regulations concerning respirator use.

All asbestos technicians must pass four day AHERA certified technician training; all supervisors must pass five day AHERA certified supervisor training. Courses are given by qualified third party professional trainers. Environmental technicians must pass 29 CFR 1910.120 forty hour training provided by qualified trainers. Retraining will be administered annually from the date of previous training, unless one or more of the following occur:

- Changes in the workplace render the previous training obsolete;
- Inadequacies in the employee's knowledge or use of the respirator indicate that the employee did not retain the requisite understanding;

- Other situations arise in which retraining appears necessary to ensure safe respirator use.

Annual training will be provided on:

. The basic respiratory protection practices.

. The nature and extent of respiratory hazards to which person(s) under his supervision may be exposed.

. The principles and criteria of selecting respirators.

. The training of respirator wearers.

. The issuance of respirators.

. The inspection of respirators.

. The use of respirators, including monitoring of its use.

. The maintenance and storage of respirators.

. The regulations concerning respirator use.

. Maintaining written records of names and dates of training.

. MARCOR weekly fit check procedure.

J. Respirator Use, Maintenance and Repair

1. Usage for Asbestos Abatement

Respiratory protection devices shall be donned in the clean room where the employee changes from street clothes to protective clothing.

Upon exiting the work area, the employee must disrobe in the contaminated room prior to the shower. When entering the shower, the employee may be wearing a nylon or neoprene swimsuit and must

leave the respirator in place until after starting to shower. Once the respirator has been cleaned of surface debris, the employee may remove it and proceed with his/her shower.

2. Additional Usage Information

Employees must leave the respirator use area in order to: wash their faces and respirator facepieces to prevent skin and eye irritation as necessary; if they detect vapor or gas breakthrough, changes in breathing resistance or leakage of the facepiece; or to replace the respirator, filter, cartridge or canister elements as necessary.

If an employee detects vapor or gas breakthrough, changes in the breathing resistance or leakage, the respirator must be removed from service and repaired before the employee can return to the work area.

3. Use in Immediately Dangerous to Life and Health (IDLH) Atmospheres

One or more employees must be located outside of the IDLH atmosphere when work is being conducted in such atmospheres. Visual, voice or signal line communication must be maintained between the employee(s) in the IDLH atmosphere and those located outside of the IDLH atmosphere.

The employees located outside of the IDLH atmosphere must be trained and equipped to provide effective emergency rescue procedures. The Supervisor, and if possible, the Operations Manager must be notified before the employee(s) located outside of the IDLH atmosphere enter the atmosphere to perform emergency rescue.

4. Cleaning

Respirators shall be cleaned by employees after each use in accordance with the following or the manufacturers' recommendations, provided these recommendations are as effective:

- Remove the filters, cartridges or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses or any components recommended by the manufacturer. Discard or repair any defective parts.

- Wash components in warm water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to remove dirt.

- When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in either: a hypochlorite solution (50 ppm of chlorine) made by adding one milliliter of laundry bleach to one liter of water at 43 degrees C. or; a aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43 degrees C; or a commercially available cleanser of equivalent disinfectant quality when used as directed and approved by the manufacturer.

- Rinse components thoroughly in clean water (43 degree C maximum), preferably running water. Drain. Make sure that the components are rinsed completely to ensure that detergents or disinfectants do not dry on the facepiece, since these may result in dermatitis or deteriorate the rubber or metal parts of the components.

- Dry components with a clean lint-free cloth or allow to air dry. Reassemble facepiece, replacing the filters, cartridges and canisters where necessary.

- Test the respirator to ensure that all components work properly.

5. Storage

Respirators must be stored in a manner that protects them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals. They should also be stored in a manner that will not cause deforming. Follow the applicable manufacturer's recommendations on storage.

Suggested storage containers:

- Hermetically-sealed plastic bags or plastic bags capable of being sealed.
- Plastic containers with tight-fitting lids, such as freezer containers.
- Cans with tight-fitting lids.

Respirators and components must be kept and transported in the respirator bag issued by the company.

Emergency respirators must be kept accessible to the work area in stored compartments or in covers that are clearly marked as containing emergency respirators.

6. Inspection

The employee must inspect his or her respirator before each use, during cleaning and after cleaning. Respirators for emergency use must be inspected at least monthly and before and after each use.

At a minimum, respirators must be inspected for:

- Respirator function, tightness of connections, the condition of various parts including the facepiece, head straps, valves, connecting tube, and cartridges, canisters or filters

- Signs of deterioration and pliability for elastomeric parts

Self-contained breathing apparatus (SCBA) must be inspected monthly. Air and oxygen cylinders will be maintained in a fully charged state and will be recharged when the pressure falls to 90% of

the manufacturer's recommended pressure level. Regulator and warning devices must be inspected to ensure proper functioning.

7. Maintenance

Respirators should be inspected by the wearer prior to each use and during cleaning following each use. Any worn or broken parts shall be replaced prior to reuse.

Replacement filters shall be available from MARCOR to individuals using filter respirators and should be replaced when an increase in breathing resistance is detected.

All replacement parts must be approved by the manufacturer to avoid alteration to the respirator. Parts are not interchangeable and parts approved for one respirator will void NIOSH approval on another. All repairs must be done by persons trained in proper respirator assembly and correction of possible respirator malfunctions and defects. Unapproved parts and untrained persons making repairs will cause the NIOSH approval to be invalid.

Following repair to a respirator, the wearer must be fit tested prior to resuming use of the respirator.

Health and Safety Coordinator shall from time to time check to see that respirators are being used correctly and are in good working order.

8. Respirator Sealing Problems and Other Restrictions

The following are some reasons why a respirator may not seal.. Under no circumstances shall an individual be permitted to enter a work area prior to achieving the proper respirator fit.

- Facial hair that passes between the face and sealing surface of the respirator or interferes with the function of respirator valves.

- Spectacles with temple bars or straps or other eye and face protective devices that pass between the face and sealing surface of the respirator.

- Head coverings that pass between the face and sealing surface of the respirator.

- Scars, hollow temples, excessively protruding cheekbones, deep creases in facial skin, the absence of teeth or dentures or unusual facial configurations that prevent the face to facepiece seal.

Wearing contact lenses while wearing a respirator is prohibited.

9. Respirator Use in Extreme Temperatures

For recommendations on using respirators in temperature extremes see:

- ANSI Z88.2 - 1980 Section 9.5 Respirator Use in Low Temperature Environments. (Attached)

- ANSI Z88.2 - 1980 Section 9.6 Respirator Use in High Temperature Environments. (Attached)

10. Respirator Identification

All respirators shall be marked with a MARCOR identification number as is all equipment. The method used to install the ID number shall not damage or alter the operation or fit of the respirator. (See MARCOR Procedure # 05-625 on Identification of Equipment).

When assigning respirators, the ID number will be recorded to indicate that the respirator is the responsibility of the employee. Each fit test must indicate the ID number of the respirator.

K. Documentation and Record Keeping

The Supervisor is responsible to fit check all employee respirators on the first day of each week or the first day of each job and to review safety subjects pertinent to the job. The Supervisor must complete the Fit Check Form #05410F4, noting the name of all employees, their respirator types, respirator fit and condition. Each employee initials by his name to confirm the respirator fit check. The completed forms are to be filed in the job file.

The Operations Administrator is responsible to post the personal air sample monitoring results promptly upon receipt from the lab using the Personal Monitoring Result Form #02101F1. The forms should be posted in a central location accessible to affected employees, and remain posted for one month. After the forms are taken down, they are to be filed in a Personal Monitoring File with the Personnel Files and made available to employees upon request.

The personal monitoring results for each employee are filed in his/her personnel file and a copy forwarded to the Human Resources Administrator in Hunt Valley.

Documents

Absolutely all documentation must be an original or a reproduction by a duplicating machine. No facsimile (FAX) copies shall be maintained for records as the print eventually fades, unless a plain paper FAX is used.

REFERENCES

29 CFR 1926.1101 The OSHA Asbestos Standard for the Construction Industry
29 CFR 1910.1001 The OSHA Standard for General Industry
40 CFR 763.120, 121 Environmental Protection Agency Regulators Governing Asbestos Abatement Projects
29 CFR 1910.134 OSHA Respiratory Protection Standard
ANSI Z88.2 - 1980 American National Standards Institute, Practices for Respiratory Protection
EPA-560-OPTS-86-001 September 1986 EPA NIOSH A Guide to Respiratory Protection for the Asbestos Abatement Industry

FORM UPDATED: 04/07/98 FORM # 02101F3

AIR MONITORING DATA SHEET

Project:_____ Job Number:_____ Dump ID Number:_____

Address:_____ Date:_____ Last Rotometer Calibration:_____

Activity:_____ Neg. Air:_____ In. H2O

Sampled For: ( ) Asbestos ( ) Airborne Dust: ( ) Vapor ( ) Gas

Method of Analysis: ( ) NIOSH 7400 ( ) ORM ( )_____

PERSONAL PROTECTIVE EQUIPMENT UTILIZED DURING SAMPLING

( ) Full Body Covering
( ) Air Purifying (Type A) ( ) Half-Face ( ) Full-Face
( ) Power Air Purifying (Type B)
( ) Supplied Air (Type C) ( ) Continuous Flow ( ) Pressure Demand

Employee Sampled:_____
Social Security Number:_____
Position: ( ) Technician ( ) Crew Leader ( ) Supervisor ( )_____
Description of Activity:_____

Instrument Serial #	Calibrated Flow Liters/Minute		Sample ID No.	Test Period Time		Location of Sample		Sample Type R-Preliminary I-Interim A-Area P-Personal	Result
	Start	Stop		Start	Stop	Area	IWA or OWA		

Individuals represented by the sample taken:

Name(s):	SSN:	Resp. Type:
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Project Supervisor:_____ Date:_____

Analysis Performed By:_____
(Company Name)

Date Submitted_____ Submitted By:_____

Procedure Number: 02-101-05
Procedure Name: Respiratory Protection

MARCOR Procedures

02-102	Respiratory Protection
05-415	Worker Decontamination - Asbestos
05-501	Asbestos Abatement
05-505	Lead Abatement
06-132	Medical Surveillance
05-410	Tailgate Safety Meetings/Fit Checks

American National Standards Institute
Practices for Respiratory Protection
ANSI Z88.2 - 1980

9.5 Respirator Use in Low Temperature Environments

A low temperature environment may cause fogging of the lens in a respiratory-inlet covering and freezing or improper sealing, or both, of the exhalation valve. Coating the inside surface of the lens may prevent fogging at low atmospheric temperatures approaching 0° C (32° F), but severe fogging of the lens may occur at temperatures below -18° C (0° F). Full facepieces are available with nose cups that direct the warm and moist exhaled air through the exhalation valve without contacting the lens, and these face-pieces should provide satisfactory vision at temperatures as low as -32° C (-25° F). At very low atmospheric temperatures, the exhalation valve of a respirator may freeze open or closed due to the presence of moisture. Dry respirable air should be used with an air-line respirator and with the type of self-contained breathing apparatus that employs a cylinder of air when these devices are used in a low temperature atmosphere. The dew point of this breathing air should be appropriate to the temperature of the atmospheric air. High pressure connections on self-contained breathing apparatus may leak because of metal contraction at low atmospheric temperature. These connections should not be overtightened, since they may break when the apparatus is returned to an atmosphere at normal room temperature. Some air-line-type supplied-air respirators may be equipped with a device called a vortex tube to warm the air supplied to the respirator-inlet covering of the respirator. Emergency-use respirators that are stored in low temperature environments may require special elastomeric components that will retain their elasticity at low temperatures (regulator diaphragms, gaskets, and breathing tubes). Facepieces stored in low temperature environments can become stiff and distorted to a degree that may prevent an adequate seal of the face to the facepiece. Special care shall be used to prevent distortion of facepieces stored at low temperatures. Some self-contained-breathing-apparatus models have cold-temperature accessories that may be utilized to help overcome these problems. The manufacturer's instructions shall be followed when utilizing these cold-temperature accessories.

CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
Ethanolamine	2 - 3	3(s)	6	1000
2-Ethoxy-3,4-Dihydro-1,2-Pyran	0.10 - 0.60			
2-Ethoxyethanol	"practically odorless" 0.55-1.3	5	100	6000
2-Ethoxyethyl Acetate (Cellosolve Acetate)	0.056-50 (600, animals)	5		
Ethyl Acetate	0.056-50(R) (200-400)	400(s)		10000
Ethyl Acrylate	0.00024-1 (75)	5(i)	25	2000
Ethylamine	0.021-.83 (100-Delayed)	10(i)		4000
Ethyl Benzene	0.25-200 (200)	100(i)	125	2000
Ethyl Bromide	much greater than 200 (6500)	200(s)	250	3500
2-Ethylbutanol	0.77			
Ethyl Butyl Ketone	"adequate"	50(s)	75	3000
Ethyl Butyrate	0.0082-0.015			
Ethyl Decanoate	0.00017			
Ethyldichloroarsine	0.14-1.4			
Ethyl Disulfide	0.0028			
Ethylene	400-700	(a)		27000(LEL)
Ethylene Bromide (see Ethylene Dibromide)				
Ethylene Chloride (see Ethylene Dichloride)				
Ethylene Chlorohydrin	"odorless"	C-1		10
Ethylene Diamine	3.4 - 11.2 (100)	10(s)		2000
Ethylene Dibromide	10 - 25	20/C - 50	50 (5 min)	400
Ethylene Dichloride	6.2 - 100	1 (s)	2	1000
Ethylene Glycol	0.08	20 C-50		
Ethylene Imine	2, "inadequate"	0.5(i)		
Ethylene Oxide	0.84-700	1(c)	5	800
Ethyl Ether	0.33 (200)	400	500	19000
Ethyl Formate	330 (330)	100(i)	150	8000

CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
Ethyl Glycol	25			
Ethyl Hexanol	0.138			
Ethyl Hexanoate	0.0056			
Ethyl Hexyl Acetate	0.21			
Ethyl Hexyl Acrylate	0.18			
Ethylidene Norbornene	0.007-0.073	C-5		
Ethyl Isothiocyanate	1.6 - 10.7			
Ethyl Mercaptan	0.00051 - 0.075	0.5(i)		2500
Ethyl Methacrylate	0.0067			
n-Ethylmorpholine	0.25-25. fatigue (40-100)	5(s)		2000
Ethyl Pelargonate	0.0014			
Ethyl Phthalate	"odorless"	5 mg/m		
Ethyl Selenide	0.0012-0.014	0.2 mg/m (as Se)		
Ethyl Selenomercaptan	0.0003	0.2 mg/m (as Se)		
Ethyl Silicate	85 (250)	10(s)		
Ethyl Sulfide	0.00060-0.068			
Ethyl isoValerate	0.12			
Ethyl n-Valerate	0.06			
Ethyl Undecanoate	0.00054			
Eugenol	0.0046			
Fluoride Dust	(5.0 mg/m)	2.5 mg/m (s)		500 mg/m
Fluorine	0.035-3 (25-100)	0.1 (i)	2	25 ppm
Fluorotricholoromethane	"odorless"	C-1000(s)		30
Formaldehyde	0.1-1.0 (.25 - 2)	1	2	30
Formic Acid	21 (15)	5 (i)		100
Fuel Oil =1 (Kerosene, Jet Fuel)	0.082 - 1			
Fuel Oil =2 (Diesel Fuel)	0.082			

CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
Fuel Oil #4	0.5			
Fuel Oil #6	0.13			
Fumaric Acid (trans Butendioic Acid)	"odorless"			
Furfural	0.25-5 (13.5 - 50)	2(i)	10	250
Furfuryl Alcohol	8	10	15	250
Gasoline	0.005 - 10	300 (i)	500	
Gylcol Diacetate	0.312			
n-Heptal Chloride	0.06			
Heptachlor	0.02	0.5 mg/m		700 mg/m
n-Heptane	50-220	400(s)	500	5000
Heptanone	0.057-20	100		
Heptaldehyde	0.05			
HETP (see TEPP)				
Hexachlorocyclopentadiene	0.15 - 0.33	0.01(i)		
Hexamethylenediamine	0.0009			
n-Hexane	3-10 (1400 - 1500)	50(s)		5000
Hexanoic Acid	0.0061			
Hexanol	0.0050 - 0.09			
sec-Hexyl Acetate	100 (100)	50(i)		4000
Hydrazine	3 - 4	0.1(c)		80
Hydrocinnamyl Alcohol	0.00027			
Hydrogen Bromide	2 (3-6)	3(i)		50
Hydrogen Chloride	1-10 (35)	C-5(i)		100
Hydrogen Cyanide	0.00027-5. fatigue	4.7		50
Hydrogen Fluoride	0.04 (5)	3(i)	6	20
Hydrogen Peroxide	"odorless" (100)	1(i)		75
Hydrogen Selenide	0.3-3. fades fast (1.5)	0.05(i)		2
Hydrogen Sulfide	0.00001 - 0.8n (50-100) fatigue at high concentration	10(s)	15	300

CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
Idoform	0.4-0.5	0.6		
Iodine	(1.63-within 2 minutes)	c-0.1 (i)		10
Ionone	0.00012			
Isoamyl Acetate	0.002 - 7 (100)	100 (i)	125	3000
Isoamyl Alcohol	10-35 (100 - 500)	100 (s)	125	10000
Isobutyl Alcohol	1.8 - 40	50 (s)	75	8000
Isobutyl Acrylate	0.009 - 0.012			
Isobutyl Cellosolve	0.114 - 0.191			
Isobutyl Mercaptan	0.00054 - 0.00097			
Isobutyraldehyde	0.047 - 0.336			
Isobutyric Acid	0.001			
Isocyanochloride	0.98			
Isodecanol	0.031 - 0.042			
Isopentanoic Acid	0.015 - 0.026			
Isophorone	0.54	C-5		800
Isoprene (2-Methylbutadiene)	0.005			
Isopropanolamine Dodecylbenzene Sulfonate	0.3			
Isopropyl Acetate	0.9(R) - 400 (200)	250 (i)	310	16000
Isopropyl Alcohol	7.5 - 200 (400)	400 (i)	500	12000
Isopropylamine	0.71 - 10 (10 - 20)	5 (i)	10	4000
Isopropylether	0.053 - 300 (800)	250 (i)	310	10000
Isopropyl Glycidyl Ether	300	50	75	1500
Isopropyl Mercaptan	0.00025			
Kerosene (see Fuel Oil #)				
Ketene	(-23)	0.5 (i)	1.5	25
Kuwait-Crude	0.1-0.5			
Lactic Acid	4 X 10			
Lauric Acid	0.0034			
Laurly Mercaptan	4 mg/m			

CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
Light Gasoline	800	300 (i)	500	
Lindane	"practically odorless" 3.9 mg/m - 21.3 mg/m	0.5 mg/m (s)		1000 mg/m
Linoleyl Acetate	0.0016			
Lithium Hydride	(0.1 mg/m)	0.025 mg/m (i)		50 mg/m
LPG	20,000 (propane)	1000	1250	19000 (LEL)
Magnesium Dodecyl Sulfate	0.2			
Malathion	10 mg/m (R) (84.8 mg/m)	10 mg/m (s)		5000 mg/m
Maleic Anhydride	0.25 - 0.5 (.25 - 1.83)	0.25 (i)		
Menthol	1.5			
2-Mercaptoethanol	0.64			
Mercury, Inorganic(except Mercury Pernitrate has an odor)	"odorless"	0.05 mg/m (s)		28 mg/m
Mesitylene (see Trimethybenzene)				
Mesityl Oxide	0.051 - 12	15	25	5000
Methoxynaphthalene	0.00012			
Methyl Acetate	200 (10,000)	200 (i)	250	10000
Methyl Acetylene-Propadiene Mix	100	1000	1250	10000
Methyl Acrylate	20 (75)	10 (i)		1000
Methylacrylonitrile	2-14 (fatigue)	1 (s)		
Methyl Alcohol	53.3 - 5900 (7500 - 69000)	200 (s)	250	25000
Methylamine	0.021 - 10, fatigue, (20-100)	10 (s)		100
Methyl Amyl Acetate	0.23 - 0.40			
Methyl Amyl Alcohol (Methyl Isobutyl Carbinol)				
Methyl Anthranilate	0.00066 - 0.06			
Methyl Bromide	>20, "practically no odor"	5 (s)		2000

CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
2-Methyl-2-Bu8tanol (t-Amyl Alcohol)	0.23 - 23			
Methyl n-Butyrate	0.0026			
Meryl Cellosolve	.22 - 60	25		2000
Methyl Cellosolve Acetate	0.64 - 50	25		4000
Methyl Chloride	10-100 "no odor" (500 - 1000)	50 (s)	100	10000
Methyl Chloroform	20-500 (500-1000)	350 (s)	450	1000
Methyl 2-Cyanoacrylate	1 - 3	2 (i)	4	
Methylcyclohexane	500	400 (s)	500	10000
Methylcyclohexanol	500 (500)	50 (s)	75	10000
Methyl Dichloroarsine	0.11			
Methylene Biphenyl Isocyanate (MDI)	(0.05 - 0.1)	C-0.2 mg/m		100 mg/m
Methylene Chloride	"can adapt to odor" 25-320 (5000)	50/C - 100		5000
Methyl Ethanol Armine	3.4			
Methyl ethyl Ketone (MEK)	4.8 - 25	200 (i)	300	3000
Methylethyl Pryrdine	0.008 - 0.050			
Methyl Formate	1500-2000, fatigue, (3500)	100 (i)	150	5000
Methy Glycol (1,2-prpylene glycol)	60			
5-Methyl-3-Hepanone (Ehtyl Amyl Ketone)	6, (50)	25 (i)		3000
Methyl Hydrazine	1 - 3	C-0.2 (c)		50
Methyl Iodide	4300	2(c)		
Methyl Isoamyl Alcohol	0.2			
Methyl Isoamyl Ketone	0.28	50		
Methyl Isobutyl Ketone	0.28 - 8	50 (i)	75	
Methyl Isocyanate	2.0 (ss)	0.02		20
Methyl Mercaptan	0.0021 - 1.1	0.5 (i)		400
Methyl Methacrylate	0.05 - 0.34 (170-250)	100 (i)	125	4000
2-Methylpentaldehyde	0.136			

CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
1.3 - Butadiene	0.16 - 1.8 (>8000)	10(i)		20000(LEL)
Iso-Butane	1.2	800(s)		
n-Butane	5.5 - >5000	800(s)		
2-Butoxyethanole	(100 - 195)	25(s)	75	700
Butyl Acetate	0.037 - 20 (300)	150(i)	200	10000
iso-Butyl Acetate	0.002 - 7, (<150)	150	187	
sec-Butyl Acetate	4 - 7	200(i)	250	10000
tert-Butyl Acetate	0.004 (200)	200(i)	250	10000
Butyl Alcohol	1 - 15 (25 - 100)	C-50(s)		8000
iso-Butyl Alcohol	40	50	75	
sec-Butyl Alcohol	43	100(s)	150	
tert-Butyl Alcohol	73 (100)	100(s)	150	
Butylamine	0.24 - 5 (10-15)	C-5(i)		2000
sec-Butylamine	0.24 (as n-Butylamine)			
tert-Butylamine	0.24 (as n-Butylamine)			
Butyl Cellosolve	0.48			
Butyl Cellosolve Acetate	0.2			
n-Butyl Chloride	13			
1-Butylene (1-Butene)	0.07 - 26			
2-Butylene (2-Butene)	0.57 - 22			
butyl Ether	0.24 - 0.47			
Butylene Oxide	0.71			
n-Butyl Formate	17			
iso-Butyl Mercaptan	0.00054 - 0.00072			
n-Butyl Mercaptan	0.00082 - 0.38	0.5(i)		2500
tert-Butyl Mercaptan	0.00009 - 0.06			
Butyl Sulfide	0.015 - 0.18			
p-tert-Butyltoluene	5 (5-8)	10(s)	20	1000
n-Butiraldehyde	0.0046 - 0.039			
Butyric Acid	0.00056 - 0.001			

CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
iso-Butyric Acid	0.001			
Cadmium Dust	"inadequate"	.05 mg/m (s)		40 mg/m
Cadmium Fume	"inadequate"	C-0.05 mg/m (s)		40 mg/m
Calcium Dodecylbenezene Sulfonate	0.3			
Calcium Hydroxide	"odorless"	5 mg/m		
Calcium Hypochlorite	3.5 (as Chlorine)			
Calcium Phosphide	0.13 - 13.4			
Camphor Synthetic	0.018 - 200 (1.77)	2(i)		200 mg/m
Caprolactam	0.065	5(i)	10	
Carbaryl (Sevin)	"essentially odorless"	5 mg/m (s)		625 mg m
Carbitol Acetate	0.157 - 0.263			
Carbon Dioxide	"odorless"	1000(s)	30000	50000
Carbon Disulfide	0.0011 - 7.7	4	12	500
Carbon Monoxide	"odorless"	35(s)	200	1500
Carbon Tetrachloride	21.4 - 200	2(c)		300
Carvacrol	0.0023			
Chloral	0.047			
Chlordane	"odorless"	0.5 mg/m (s)	2.0 mg/m	500 mg/m
Chlorine	0.01 - 5 (1-6)	0.5	1	30
Chlorine Dioxide	0.1 (5.0)	0.1 (i)	0.3	10
Chloroacetaldehyde	<1 (0.01 - 1)	C-1(i)		100
Chloromatic Acid	0.045	0.3		
Chloroacetophenone	0.01 - 1.35 (0.024-.063)	0.05(i)		100 mg m
(CN. Tear Gas)				
Chlorobenzene	0.21 - 60	75(s)		2400
o-Chlorobenzylidene malononitrile	0.2	C 0.05(s)		2 mg m
Chlorobromomethane	400	200 (s)	250	5000

CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
Chloroform	50-307, fatigue (>4096)	2		1000
Chloromethane (see Methyl Chloride)				
Chlorophenol	0.034			
0-Chlorophenol	0.0036			
p-Chlorophenol	1.2 - 30			
Chloropicrin	1.1 (0.3 - 0.37)	0.1(i)	0.3	4
Chlorosulfonic Acid	1-5 (from HCl produced)			
Chlorovinyl Arsine	1.6			
Cinnamaldehyde	0.0026			
Citric Acid	"odorless"			
Cobalt Metal Fume & Dust	(>1 mg/m)	0.01 mg/m		20 mg/m
Coumarin (Coumaphos, Baymix)	0.0033 - 0.2			
Crag Herbicide	"none"	10 mg/m (n)	20 mg/m	5000 mg/m
m-Cresol	0.25 - 0.68	5(s)		250
0-Cresol	0.26 - 0.68	5(s)		250
p-Cresol	0.00047 - 0.0455	5(s)		250
Crotonaldehyde	0.035 - 7.35 (45)	2(i)	6	400 mg/m
Crotyl Mercaptan	0.00016 - 0.0099			
Crude - Heavy (Loganillas-Crude)	0.1 - 0.5			
Crude-Light (Louisiana-Crude)	0.1 - 0.5			
Crude-Medium (Barbados-Crude)	0.1 - 0.5			
Cumene	0.047 - 1.2	50 (s)	75	8000
Cyanogen Chloride (CNCL)	1	C-0.3(s)		
Cyclohexane	0.41 - 300 (300)	300 (i)	375	10000
Cyclohexanol	100 - 160 (100)	50 (i)		3500
Cyclohexanone	0.12 - 0.24	25 (i)	100	5000
Cyclohexene	"assume 0.41" (300)	300(i)	375	10000

CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
Cyclopentadiene	250	75(i)	150	2000
2.4-D esters	0.02 - 0.1	10 mg/m		500 mg/m
DDT Dichlorophenyl trichoroethane	2.9 mg/m	1 mg/m (s)		
Decaaborane	0.05 - 0.35 (fatigue)	0.05 (s) 0.3 mg/m	0.15 0.9 mg/m	100
Decanoic Acid	0.002			
Decanal	0.0064-0.168			
1-Decylene	0.12			
Diacetone Alcohol	1.1 - 1.7	50	75	2100
Diacetyl	0.025			
Diallyl Ketone	9			
Diazomethane	"inadequate"	0.2(i)		2
Diborane	2-4 "not reliable"	0.1(s)		40
Di-N-Butyl Amine	0.27 - 0.48			
Dibutyl Phosphate	"inadequate"	1(i)	2	125
Dichlorobenzene	0.005			
0-Dichlorobenzene	2 - 50 (20-30)	C-50(i)		1700
p-Dichlorobenzene	15-30 (80-160)	75(s)	110	1000
Dichlorodiethyl Sulfide (Mustard Gas)	0.19			
Dichlorodifluoromethane	"odorless"	1000(s)		50000
1.3-Dichloro-5.5-Dimethylhydantoin	"adequate" 0.01 (1.14)	0.2mg/m (i)	0.4 mg/m	
Dichloroethane	120, "adequate"	100	250	
Dichloroethylene	0.085 - 500	200(s)	250	4000
Dichloroethyl Ether	1-35 (100-200)	5(i)	10	250
bis-a-Dichloroethyl Sulfide	0.0023			
Dichloroisopropyl Ether	0.32			
Dichloromethane (see Methylene Chloride)				

CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
2-Methyl-1-Pentanol	0.024 - 0.082			
2-Methylpropene	0.57			
Methyl Salicylate	0.096	1 (i)		
a-Methyl Styrene	0.156 - 200 (200)	50 (i)	100	5000
Methyl Sulfide (see Dimethyl Sulfide)				
Methyl Thiocyanate	0.25 - 3.2			
Methyltrichlorosilane	1			
Methyl Vinyl Ketone	0.2			
Methylvinyl Pyridine	0.04			
Mineral Spirits	30			
Morpholine	0.01 - 0.14	20 (s)	30	8000
Musk (Synthetic)	0.0000004			
Naphtha - coal tar	4.68 -100 (200 - 300)	100		10000
Naphtha - petroleum (rubber solvent)	<500	400 (s)		
Naphthalene	0.003 - 0.3 (15)	10 (i)	15	500
2-Naphthol	1.3			
Nickel Carbonyl	1 - 3	0.05 (s)		0.001
Nitric Acid	0.3 -1.0 (62)	2	4	
Nitric Oxide	"odorless" 0.3 - 1 "poor"	25 (s)		100
p-Nitroaniline	"odorless"	3 mg/m (s)		300 mg/m
Nitrobenzene	0.0047 -6	1 (s)		200
o-Nitrochlorobenzene	0.002	0.5 (s)		
Nitroethane	163 - 200 (1000 - 500)	100 (s)		1000
Nitrogen Dioxide	4 - 5 (5 - 20)	3 (s)	5	50
Nitrogen Trioxide	5	3 (s)	5	50
Nitrogen Trifluoride	"no odor - warning properties at potentially danagerous levels"	10 (s)		2000
Nitromethane	100 (200 - 500)	100 (s)		1000
1-Nitropropane	300 (150)	25 (s)		2300

CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
2-Nitropropane	300	C25 (s)		
Nitrotoluene (m.o.p isomers)	1.74 (as toluene)	2 (s)		200
Nitrous Oxide	"poor"			
n-Octane	4 - 150	300 (s)	375	5000
Octanoic Acid	0.0014			
1-Octanol	0.0021			
2-Octanol	0.0026			
Oenanthic Acid (Heptanoic Acid)	0.015			
Oxygen Difluoride	0.1 - 0.5 (fatigue)	0.05 (s)	0.15	0.5
Ozone	0.005 - 0.5 (1 - 3.7)	0.1 (i)	0.3	10
Parathion	0.48 mg/m	0.1 mg/m (s)		20 mg/m
Pelargonic Acid (Nonyl Alcohol)	0.00086			
Pentaborane	0.8 (1)	0.005 (s)	0.015	3
Pentachlorophenol	9.3 mg/m (0.3 - 1 mg/m)	0.5 mg/m (s)		150 mg/m
n-Pentane	2.2 -1000	600 (s)	750	5000
2,4 -Pentanedione	0.02			
Pentanone (Methyl Propyl Ketone)	8	200 (s)	250	5000
Pentanol (see Amyl Alcohol)				
Pentene (n-Amylene)	2.2			
isoPentyl Acetate (see Isoamyl Acetate)				
n-Pentyl Acetate (see n-Amyl Acetate)				
1-Pentyl Mercaptan	0.00021			
Perchloromethyl Mercaptan	much less than 0.1	0.1 (i)		10
Perchloryl Fluoride	10 (but not reliable)	3 (s)	6	385
Pero-Klean-No-818	0.005			

CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
Petroleum Distillates (Pet Naptha)	<500	400		10000
Phenol	0.047 - 5 (48)	5 (i)	10	100
Phenyl Ehter	0.001 - 0.10 (3 - 4)	1 (i)	2	
Phenyl Ether-Bipheny Mixture	0.1 - 1 (3 - 4)			
Phenyl Isocyanate	0.029 mg/m			
Phenyl Isothiocyanate	0.43			
Phosgene	0.125 - 1 (R)(dulls senses) (1-2)	0.1 (s)		2
Phosphine	0.02 - 3	0.3 (s)	1	200
Phosphorus Pentasulfide	"fatigue", 0.0047 (as H S)	1 mg/m (i)	3 mg/m	750 mg/m
Phosphorus Trichloride	0.7 (2-4)	0.2 (i)	0.5	50
Phthalic Anhydride	0.05 - 0.12	1	4	10000
2-Picoline	0.023 - 0.046			
Propane	1000 - 20.000	(a)		20000
Propionaldehyde	0.04 - 1			
Propionic Acid	0.034	10	15	
n-Propyl Acetate	0.15 - 200	200 (i)	250	8000
Propyl Alcohol	0.08 - 200 (5500)	200 (i)	250	4000
Propylene (Propene)	"poor" 67.6	(a)		
Propylene Diamine	0.048 - 0.067			
Propylene Dichloride	0.5 - 130	75 (s)	110	2000
Propylene Glycol	"odorless"			
Propylene Oxide	35 - 200 (457, animals)	20		2000
Propyl Mercaptan	0.0075 - 0.02			
n-Propyl Nitrate	50 - 90	25 (s)	40	2000
Propyl Sulfide	0.011 - 0.17			
Pyridine	0.012 - 5 fatigue at 5, but taste remains	5 (s)	10	3600
Pyrogallol (1.2.3 - Benzenetriol)	20			
Quinoline	0.16 - 71	0.1-		

CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
Quinone	0.1 - 0.5-fatigue (0.1 - 0.5)	0.1 (i)	0.3	75
Resorcinol (1.3-Benzenediol)	40	10 (i)	20	
Rotenone	"odorless" 222 mg/m	5 mg/m (s)	10 mg/m	5000 mg/m
Safrole	0.0032			
Selenium Oxide	0.0002 mg/mg	0.2 mg/m (as Se)		100 mg/m
Silver Cyanide	"odorless"	0.01 mg/m (as silver)		
Silver Nitrate	"odorless"	0.01 mg/m (as silver)		
Skatole (3-Methyl-Indole)	.000000075 - 1.68			
Sodium Butyldiphenol Sulfanate	0.5 (as alky aryl sulfonate)			
Sodium Butylphenylphenol Sulfonate	0.5 (as alky aryl sulfonate)			
Sodium Dodecylbenzene Sulfonate	0.5 (as alky aryl sulfonate)			
Sodium Hydroxide	"odorless"	C-2 mg/m (i)		200 mg/m
Sodium Nitrochlorobenzene Sulfonate	0.5 (as alky aryl sulfonate)			
Sodium Octyl Sulfate	0.2			
Sodium Sulfate	"odorless"			
Sorbitol	"odorless"			
Stoddard Solvent	1-30 (400)	100 (s)	200	5000
Strychnine	"odorless"	0.15 mg/m (s)		3 mg/m
Styrene	0.047 -200 (200 - 400)	50 (s)	100	5000
Styrene Oxide	0.4			
Sulfoxide	91			
Sulful Dicholoride (SCL)	0.001			
Sulfur Dioxide	0.47 - 5 (6-20). 0.3 - taste	2 (i-s)		100
Sulfur Monochloride (sulfur chloride)	0.001 (2-9)	1 (i)	3	10

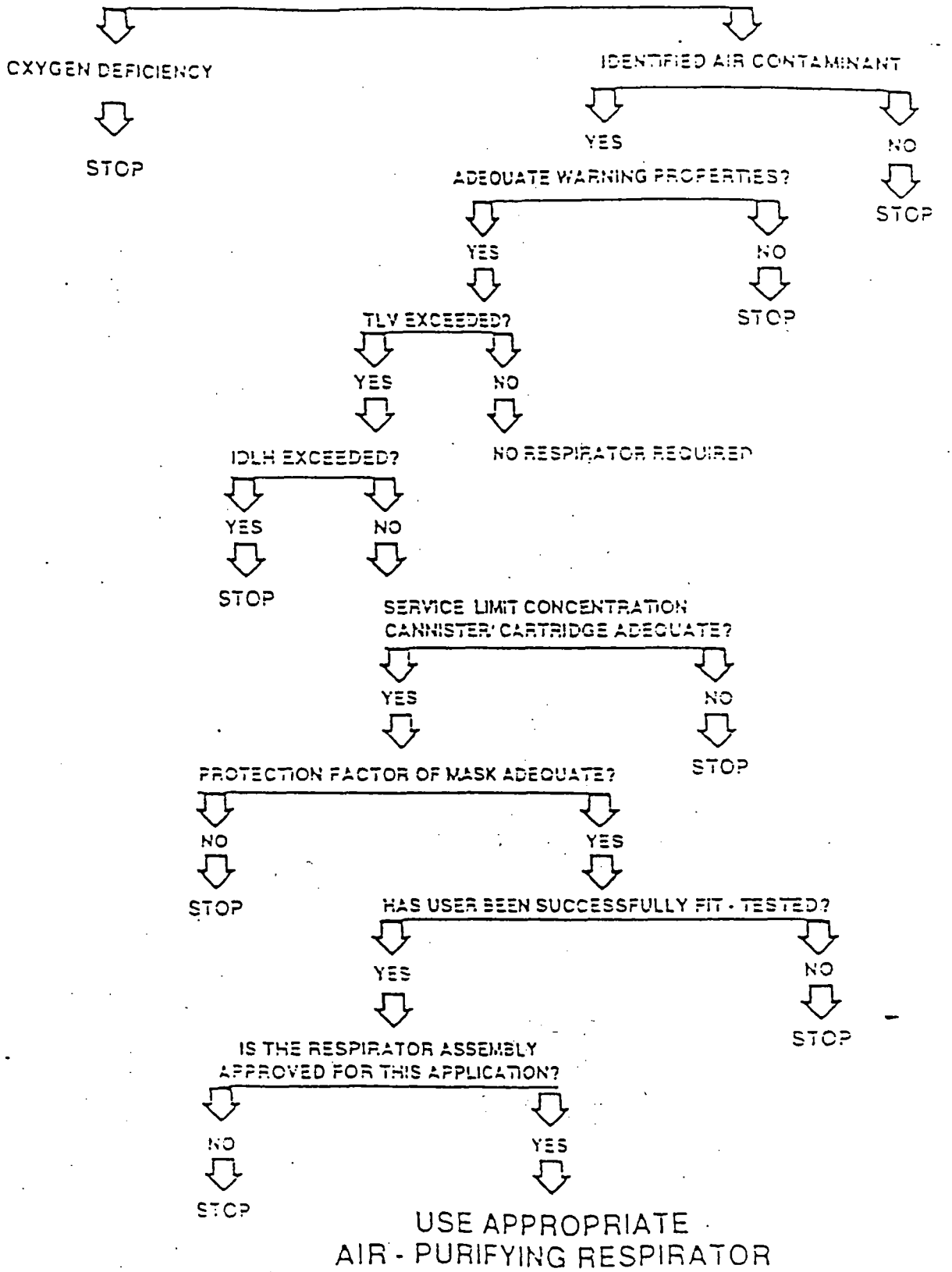
PERSONAL MONITORING RESULTS

MARCOR _____

NAME OF EMPLOYEE	SOCIAL SECURITY #	SAMPLE DATE	JOB NUMBER	RESPIRATOR TYPE A,B,C	NAME OF LAB	RESULT

APPENDIX C

CAN AN AIR - PURIFYING RESPIRATOR BE USED?



CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
Sulfuric Acid	0.6 mg/m - 2.4 mg/m	1 mg/m (i)		80 mg/m
Sulfuryl Fluoride	"odorless"	5 (s)	10	1000
Tannic Acid	2 - 4			
TEEP (HETP. Bladex. Vapotone)	"odorless"	0.004 mg/m (s)		10 mg/m
Terphenyls	>1.0	C-0.5 (s)		3500 mg/m
1,1,2,2-Tetrachloroethane	3 - 5	1 (s)		150
Tetrachloroethylene (Perchloroethylene)	4.68 - 50 (106 - 690)	50 (s)	200	500
Tetraethyl-o-Silicate	5.0 - 7.2	50 (s)	200	500
Tetrahydrofuran	20 - 50	200 (i)	250	25000
Tetramethylbenzene	0.0029			
Tetranitromethane	0.4	1 (i)		5
Thiocresol (Toluenethiol)	0.0027 - 0.02			
Thiophenol	0.014			
Thymol	0.00086			
Toluene	0.17 - 40, fatigue, (300 - 400)	100 (s)	150	2000
Toluene Diisocynate (TDI)	0.2 - 2.14	0.005	0.02	10
0-Toluidine	0.0048 - 20	5 (c)		100
Toxaphene (Phenotox)	0.0052	0.5 mg/m	1 mg/m	
1,1,1-Trichloroethane (Methyl Chloroform)	20 - 400 (500 - 1000)	350 (s)	450	1000
Trichloroethylene	21.4 - 400	50 (s)	200	10000
Trichlorofluoromethane	135 - 209	C - 1000		
Trichlorophenol	0.1 - 0.667			
1,2,3-Trichloropropane	100 (100)	10 (s)	75	1000
1,1,2-Trichloro-1,2,2-Trifluoroethane	"nearly odorless" 68 -135	1000 (s)	1250	4500
Triethanolamine Dodecylbenzene Sulfonate	0.3			
Triethylamine	0.28 (50)	10 (s)	15	1000
Triethylene glycol	"practically odorless"			

CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
Trimethylamine	0.00021 - 1.7	1+	15	
Trimethylbenzene (Mesitylene)	0.027	25 (i)	35	
Trinitrobutylxylene	.0000065 - 0.0008			
Triphenyl Phosphate	"odorless"	3 mg/m (s)		
Turpentine	200 (100)	100 (i)	150	1900
n-Undecane	0.12			
Valeric Acid	0.0006			
isoValeric Acid	0.0018			
Vanadium Pentoxide Dust & Fume	(0.5 - 2.2 mg/m)	0.05 mg/m (i)		70 mg/m
Vanillin	3.2 X 10			
Vinyl Acetate	0.12 - 0.55	10 (i)	20	
Vinyl Chloride	260	1(c) / C-5		
Vinyl Toluene	50 (50)	50 (i)	100	5000
Warfarin	"odorless"	0.1 mg/m (s)	0.3 mg/m	200 mg/m
Xylene	0.05 - 200 fatigue (200)	100 (i)	150	1000
m-Xylene	1.1 - 3.7	100 (i)	150	1000
o-Xylene	1.8	100 (i)	150	1000
p-Xylene	0.47 - 0.53 (R)	100 (i)	150	1000
Xylidene	0.0048	2		150

FORM UPDATED: 04/07/98 FORM # 02101F4

FIT TESTING INSTRUCTIONS

1. Respirator selection.

2. Review Use (let test subject use mirror to evaluate positioning on face).

3. Assess Comfort.

4. Conduct a user seal check - move head up, down, side to side.

5. Do not test if subject has hair growth between skin and face piece sealing surface.

6. If test subject exhibits difficulty breathing, refer subject to physician for reevaluation.

7. If, at any time, fit is unacceptable to subject, test subject is to choose another respirator and retest.

8. Respirator must be worn 5 minutes before start of the fit test.

9. Irritant Smoke
Instruct subject to close his/her eyes. Test conductor shall direct the stream of irritant smoke from smoke tube (containing stannic chloride) toward face seal area. The test conductor will begin 12" from face piece and move smoke stream around whole perimeter of mask. If no response from subject, the test conductor moves smoke to within 6" of respirator. If test subject has not detected smoke, proceed with exercise portion of the fit test.

10. Exercise - Test conductor will instruct the subject on the following:
   * Normal breathing - normal standing, no talking
   * Deep breathing in standing position (take caution so the subject does not hyperventilate).
   * Turn head side to side - standing, inhaling from each side.
   * Moving head up and down - standing, inhaling when head is in the up position.
   * Talking out loud. Read the "Rainbow Passage".
   * Bending over - test subject shall bend over at the waste or jog in place.
   * Normal breathing - normal standing, not talking.

11. Each exercise to be performed for one minute. The test conductor will question the subject about comfort during the test. If it is unacceptable, the test should be redone with a different respirator. The respirator shall not be adjusted once the fit test begins. Any adjustment voids the test.

12. If at any time during the test, smoke is detected, the test has failed.

13. After mask has been removed, subject shall be asked to smell the smoke from same tube as was used in the fit test. Failure to revoke a response, shall void the test. If response is produced, fit test passes.

MARCOR Remediation, Inc.
RESPIRATOR FIT TEST

OFFICE LOCATION: _____

COMPANY ADDRESS: _____

EMPLOYEE NAME (PRINT) _____ SSN _____

EMPLOYEE SIGNATURE: _____

DATE: _____

RESPIRATOR TYPE

*MAKE/MODEL _____

*SIZE _____

*MARCOR ID # _____

*NIOSH APPROVAL # _____

*CARTRIDGE TYPE _____

TESTED BY: _____ DATE PERFORMED: _____

SIGNATURE: _____

LOCATION: _____

TEST RESULTS

STANNIC CHLORIDE	FIT	VERY COMFORTABLE
	NO FIT	COMFORTABLE
		TOLERABLE
		UNCOMFORTABLE

COMMENTS: _____

RAINBOW PASSAGE

WHEN THE SUNLIGHT STRIKES RAINDROPS IN THE AIR, THEY ACT LIKE A PRISM AND FORM A RAINBOW. THE RAINBOW IS A DIVISION OF WHITE LIGHT INTO MANY BEAUTIFUL COLORS. THESE TAKE THE SHAPE OF A LONG ROUND ARCH, WITH ITS PATH HIGH ABOVE, AND ITS TWO ENDS APPARENTLY BEYOND THE HORIZON. THERE IS, ACCORDING TO LEGEND, A BOILING POT OF GOLD AT ONE END. PEOPLE LOOK, BUT NO ONE EVER FINDS IT. WHEN A MAN LOOKS FOR SOMETHING BEYOND REACH, HIS FRIENDS SAY HE IS LOOKING FOR THE POT OF GOLD AT THE END OF THE RAINBOW.

FIT CHECK

Supervisor:_____ Report Date:_____

Job Name:_____ Job Number:_____

Respirator Fit Key: G = Good Seal B = Bad Seal

Respirator Condition Key: A = Acceptable U = Unacceptable

Respirator Type Key: A = Air Purifying
B = PAPR
C = Supplied Air

NAME	*INITIALS*	*RESPIRATOR FIT*	*RESPIRATOR CONDITION*	*RESPIRATOR TYPE*

Action Required/Taken:_____

Detail action taken on any respirators with bad seals or unacceptable conditions:

_____

_____

Signature:_____ Date:_____
Supervisor

American National Standards Institute
Practices for Respiratory Protection
ANSI Z88.2 - 1980

9.6 Respirator Use in High Temperature Environments

A person working in an atmosphere having high temperature is under stress. Wearing a respirator in such an environment applies additional stress on the person. The additional stress due to the wearing of a respirator in a high temperature environment should be minimized by using a respirator having a low weight and offering a low resistance to breathing. The air-line-type supplied-air respirator is recommended for use in a high temperature environment. Air-line-type supplied-air respirators equipped with a vortex tube to cool the air supplied to the respiratory-inlet covering will substantially reduce the temperature of the air supplied to the respirator. Elastomeric components of respirators stored in high temperature environments may deteriorate at an accelerated rate and the facepiece may become permanently distorted. Special care shall be used to prevent facepiece distortion. All such respirators shall be inspected and maintained at a frequency rate that will prevent the use of respirators with deteriorated elastomeric components.

Appendix A

DO NOT USE CHEMICAL CARTRIDGE RESPIRATORS FOR THE FOLLOWING MATERIALS

1. Acrolein
2. Aniline
3. Arsine
4. Bromine
5. Carbon Dioxide
6. Carbon Monoxide
7. Dimethylaniline
8. Dimethyl Sulfate
9. Fluorine
10. Hydrogren Cyanide
11. Hydrogen Fluoride
12. Hydrogen Selenide
13. Hydrogen Sulfide
14. Methanol
15. Methylene Bisphenyl Isocyanate
16. Methylene Chloride
17. Methyl Bromide
18. Methyl Chloride
19. Methyl Isocyanate
20. Nickel Carbonyl
21. Nitro Compounds:
    - Nitrobenzene
    - Nitromethane
    - Nitrogen Oxides
    - Nitroglycerin
22. Ozone
23. Phosgene
24. Phosphine
25. Phosphorus Trichloride
26. Stibine
27. Sulfur Chloride
28. Toluene Diisocyanate (TDI)
29. Vinyl Chloride

Note: Some compounds are rated for exposure within certain limits, i.e.,
Formaldehyde - < 10 ppm
Vinyl Chloride - <10 ppm

This denotes that the cartridge can be expected to provide some protection but is not approved for use at exposures above the PEL.

Appendix B
WARNING CONCENTRATIONS OF VARIOUS CHEMICALS

The following table is a compilation of warning concentrations of various chemicals taken from several sources. A warning concentration is that concentration in air at which a person can detect the materials either by odor, taskte or by the causing of irritation. Exposure limits where they exist are included so that a comparison can be made to determine if a chemical has adequate warning properties. A material has adequate warning properties if the effects (odor, taste, irritation) are detectable and persistent at concentrations "at" or "below" the exposure limit. Please note that some sources give a statement like "adequate" or "inadequate" for the warning properties. Since the statement may be used in conjunction with a different exposure limit than is used in this table, it should be used with caution. Some of the chemicals have a range of concentrations because the different sources have different values. This can be due to the variability of human perceptions or different test methods. The sources may have used different end points for their testing. This value could be assessed when the first person detected the order, when everyone could detect it, or when 50% of the test subjects could detect it. Because of these variations, the full range of warning concentrations is given so that the user can decide which value to use.

The warning concentrations given are generally odor thresholds with irritation thresholds given in parentheses. Taste thresholds are noted as special cases. The concentration units used in the table are parts per million unless otherwise noted.

[1] The exposure limits are taken from the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) 1984-1985 unless otherwise noted. TWA = Time Weighted Average, STEL = Short Term Exposure Limit.

[2] C - Denotes a Ceiling TLV

[3] mg/m^3 - milligrams per cubic meter

[4] Fatigue - Indicates that the chemical can cause olfactory fatigue

[5] The basis of the exposure limit, if known, is noted by: i = eye, nose or throat irritation, s = systemic or structural damage, c = carcinogen, n = nuisance, a = simple asphyxiant, explosion = based on explosion hazard.

[6] Immediately Dangerous to Life or Health Level. From NIOSH/OSHA Pocket Guide to Chemical Hazards.

[7] Animal = irritation concentration based on animal studies.

[8] Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL)

[9] American Industrial Hygiene Association (AIHA) Workplace Environmental Exposure Limit (WEEL)

Appendix B
WARNING CONCENTRATIONS OF VARIOUS CHEMICALS

CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
Acetaldehyde	0.031 - 2.3 (50)	100 (i)	150	10000
Acetamide	"odorless when pure"			
Acetic Acid	0.2 - 24 (10-15)	10(i)	15	1000
Acetic Anydride	0.14 - 81.2(5)	C 5(i)		1000
Acetone	100	750(i)	1000	20000
Acetonitrile	40 (500)	40(s)	60	4000
Acetophenone	0.002 - 0.60			
Acetyl Bromide	0.0005			
Acetyl Chloride	1			
Acrolein	0.1 - 16.6 (0.21 - 0.5)	0.1(i)	0.3	
Acrylamide	'odorless"	0.3 mg/m	0.6 mg/m	
Acrylic Acid	1.04	10		
Acrylonitrile	19 - 100, fatigue	2(c)	10	
Akrol	10			
Allyl Alcohol	0.75 - 7.2, (0.75 - 25)	2(s)	4	150
Allyamine	6.3 - 28.7			
Allyl Chloride	0.47 (50-100)	1(s)	2	300
Allyl Chloromate	1.4			
Allyl Glycidyl Ether	<10	5(i)	10	270
Allyl Isocyanate	0.018			
Allyl Isothiocyanate	0.15 - 0.42			
Allyl Mercaptan	0.0005 - 0.21			
Allyl Sulfide	0.000014 - 0.01			
Ammonia	0.32 - 55 (55 - 140)	25(i)	35	500
Ammonium Hydroxide	50			
Ammonium Sulfamate	"odorless"	10 mg/m		5000 mg/m
iso-Amyl Acetate	0.0028 - .011	100(i)	125	3000

CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
n-Amyl Acetate	0.00090 - 0.08 (200)	100(i)	150	4000
sec-Amyl Acetate	0.0017 - 0.082	125(i)	150	9000
teri-Amyl	0.0017			
Amyl Alcohol (Pentanol)	0.0065 - 35			
Amylene (2-Methyl-2-Butene)	0.0065 - 35			
Amyl Isovalerate	0.11			
iso-Amyl Mercaptan	0.0043 - 0.7			
n-Amyl Mercaptan	0.07			
n-Amyl Methyl Ketone	0.0009			
Amyl Sulfide	0.0030 - 0.005			
Anethole	0.0033			
Aniline	0.5 - 70		2(s)	100
Apiol	0.0063			
Arsenic Aphydride (Pentoxide)	1	0.01 mg/m (as arsenic)		100
Arsine	0.21 - <1	0.05(s)		6
Benzaldehyde	0.003 - 0.69			
Benzene	3 - 10	1(c)	5	2000
Benzoyl Peroxide	"odorless"	5 mg/m		1000 mg/m
Benzyl Alcohol	5.5			
Benzyl Chloride	0.040 - 0.31	1(i)		10
Benzyl Mercaptan	0.00019 - 0.037			
Benzyl Sulfide	0.0021 - 0.07			
Bornyl Acetate	0.0078			
Boron Oxide	"immediate irritation"	10 mg/m		
Boron Trifluoride	1 - 1.5	c-1(s)		100
Bromine	0.05 - 3.5 (0.6 intolerable)	0.1(i)	0.3	10
Bromoacetone	0.09			
Bromoacetophenone	0.079			
Bromoform	"adequate" 530	0.5(i)		

CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
Dichloromonofloromethane	"nearly odorless"	10(s)		50000
2,4-Dichlorophenol	0.21-0.008			
1,2-Dichloropropane	50	75(s)	110	
2,2-Dichloropropionic Acid (Dalapon)	428	1		
Dichlorotetrafluorethane	"nearly odorless"	1000(s)		50000
Dicyclopentadiene	0.003 - 0.020	5		
Dieldrin	0.041	0.25 mg/m		450 mg/m
Diesel Fuel No. 1-D	0.25			
Diesel Fuel No.-2-D	0.08			
Diesel Fuel No. 4-D	0.01			
Diethanolamine	0.011 - 0.04	3(s)		
Diethylamine	0.06 - 0.498 (50. animals)	10(i)	25	2000
Diethylaminoethanol	0.04	10		500
Diethylene Glycol	"almost odorless"			
Diethylene Triamine	10	1		
Diethyl Selenide	0.00014	0.2 mg/m (as Se)		
Diethyl Succinate	0.021			
Difluorodibromomethane	"inadequate"	100(s)		2500
Diglycidyl Ether	5	0.1(s)		25
Diisobutyl Carbinol	0.048-0.160			
Diisobutyl Ketone	0.31	25		2000
Diisopropylamine	0.38-.85 (25-50. injury)	5(i)		1000
Dimethyl Acetamide	46.8	10(s)		400
Dimethylamine	0.021-6 (97-183 animals)	10(i)		2000
Dimethylaminoethanol	0.045			
Dimethylformamide	100	10(s)		3500
1,1-Dimethylhydrazine	6 - 14	0.5(c)		
Dimethyl Sulfate	"nearly odorless"	0.1(c)		10

CHEMICALS	WARNING CONCENTRATIONS	TWA	STEL	IDLH LEVEL
Dimethyl Sulfide	0.001 - 0.020			
Dimethyl Sufoxide	"practically no odor"			
Dimethyl Trithiocarbonate	0.0058 - 0.18 mg/m			
Dinitro-o-cresol	"odorless"	0.2 mg/m (s)		5 mg/m
2,6-Dinitrophenol	0.21(as phenol)			
Dinitrotoluene	"inadequate"		1.5 mg/m (s)	200 mg/m
Dioxane	1.8 - 170 (220 - 300)	25 (s)		2000
Dioxolane	64 - 128			
Diphenyl	0.01 - 0.06 (3-4)	0.2(s)	0.6	300 mg/m
Diphenylamine Chlorarsine	0.22			
Diphenyl Chloroarsine	0.03			
Diphenylcyanoarsine	0.3			
Dipheny Ether (see Phenyl Ether)				
Diphenyl Sulfide	0.0021 - 0.0047			
Diphosgene	1.2			
Dipropylamine	0.1			
Dipropylene Glycol	"practically odorless"			
Dipropylenen Glycol Methyl Ether	100	100(i)	150	
Dithoethylene Glycol	0.031			
Dodecanol	0.0064			
Dodecyclbenzene Sulfonic Acid	0.4 - 8			
Epichlorohydrin	10-16 (100)	2 (i-s)		100
EPN	"inadequate"	0.5 mg/m (s)		50 mg/m
Ethane	150-899	(a)		30000 (LEL)
1,2-Ethanedithiol	0.0042			
Ethanol	10-5100	1000(i)		